Modified PTO/SB/33 (10-05)

| PRE-APPEAL BRIEF REQUEST FOR REVIEW | Docket Number Q84448 | |
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| | Application Number 10/516,457 | Filed December 3, 2004 |
| Mail Stop AF<br>Commissioner for Patents<br>P.O. Box 1450 Alexandria, VA 22313-1450 | First Named Inventor Michel PUECH | |
| | Art Unit 1792 | Examiner Jeffrie Robert LUND |

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal

The review is requested for the reasons(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

☑ I am an attorney or agent of record.
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May 20, 2008
Date

**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Michel PUECH

Docket No: Q84448

Appln. No.: 10/516,457

Group Art Unit: 1792

Confirmation No.: 2874

Examiner: Jeffrie Robert LUND

Filed: December 3, 2004

For: HEATER LINER FOR A PLASMA ETCHING REACTOR, AND AN ETCHING METHOD USING THE LINER

**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

**MAIL STOP AF - PATENTS**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the Pre-Appeal Brief Conference Pilot Program, and further to the Examiner's Final Office Action dated December 20, 2007, Applicant files this Pre-Appeal Brief Request for Review. This Request is also accompanied by the filing of a Notice of Appeal.

Claims 1-13, 15, 16 and 19 are all the claims pending in the application. The claims are rejected as obvious combinations of the teachings of nine different references, but central to the rejection of all claims is the obviousness of combining the teachings of Bosch et al (USP 6,506,254) and Wang et al (US 2003/0188685) to teach the subject matter of claim 1, and that is the issue discussed herein.

The present invention seeks to prevent build-up of polymer deposits on interior surfaces of an etching reactor, and to this end uses a heater liner. At the top of page 5 of the application, applicant has acknowledged that it was known in the art to use a ceramic heater liner to reduce the formation of deposits on the walls of a deposition reactor. Applicant has pointed out at lines 9-12 of page 5 that such an arrangement is not suitable for an etching reactor. Thus, according to the invention, a heater liner of a suitable metal or alloy is used. As discussed in the paragraph

bridging pages 5-6 of the specification, to be compatible with an alternating etching method, the first criteria for an appropriate metal or alloy would be metals or alloys that do not react with either the etching gas or the passivation gas to form volatile compounds, and a second criteria would be metals or alloys that do not emit contaminating atoms under plasma bombardment. Applicant has found that if these selection criteria are followed, and if an alternating etching technique is used, a metal liner can be used, contrary to conventional belief.

Bosch discloses the use of a liner 20 of interlocking ceramic, as discussed at lines 41-42 column 10, preferably silicon and carbon (line 45 of col. 10). The liner 20 in Bosch is not of a metal or alloy. In the present invention, the heater liner is made of metal or alloy for the advantages thereof discussed in the specification. There is no suggestion in Bosch that a metal or alloy could be used for the liner element 20.

Wang et al. discloses a deposition processing chamber (fig. 1b and paragraph 24), comprising shields (150), an annular deposition ring (390) and a covering ring (391) around the substrate, upper (392) and lower (394) gas shields, and a liner (395) adjacent to the sidewalls (130) which may cover a portion of the internal wall of the chamber. The shields (150) may be of aluminum, titanium, stainless steel and aluminum oxide.

But it must be emphasized that Wang et al is a deposition chamber, not an etching reactor. In a deposition chamber, one does not have to worry about how the liner material will stand up to the etching process, and what contamination problems may be caused by the liner material reacting to the etching or passivation gases or when the liner material is subjected to plasma bomdardment.

It is also to be noted that Bosch et al teaches directly away from the present invention. Bosch et al describes a surface passivation technique and says that it can be used with a variety of non-oxide ceramic materials. In the paragraph beginning at line 41 of column 10, Bosch et al suggests using a liner material of silicon or silicon carbide, and at lines 47-49 of column 10 points out that this has the additional advantage (over other non-oxide ceramic materials that may contain aluminum) of minimizing aluminum contamination. With this passage teaching that

a ***ceramic*** containing aluminum has an aluminum contamination problem, one of skill in the art would clearly be led away from using an aluminum ***metal*** as a liner material

If one of skill in the art were to consider Bosch et al and Wang et al, he would see Bosch et al teaching not to use metal for a reaction chamber, consistent with the prevailing mindset in the art, and he would see Wang et al teaching that certain metals could be used in a deposition chamber. The artisan would see nothing in Wang et al that contradicts the clear teaching of Bosch et al, and would understand that the materials of the Wang et al liner are fine for deposition chambers but would see nothing suggesting that the Wang materials would be appropriate for an etching reactor. Thus, the combination proposed by the examiner would not have been made.

The present inventors have discovered that in an alternating type of etching process, the contamination of the substrate due to Al is less because the etching steps are short and are followed by a passivation step. Another reason of less contamination is an increase of homogeneity and reproducibility of thermal conditions by using the invention. It was the present inventors who first discovered the advantages and how to achieve them. For these reasons, and in spite of Bosch teaching away from the invention, the liner of the present invention is a metal or an alloy. But it is only the present inventors who have found this solution.

Since Bosch does not teach the use of a metal or alloy for the liner, and if anything suggests it would not be suitable, and since the use of Wang's liner material would not have been obvious because Wang is directed to a deposition chamber rather than an etching chamber so there would have been no reason to run counter to the direct teaching of Bosch that aluminum should be avoided, since there is no suggestion in Wang et al that a metal liner material would be at all advantageous in an etching reactor and since none of the other cited art give any reason to use a metal for the liner in place of the materials used in Bosch, the invention defined in claim 1 as well as all of its dependent claims is neither shown nor suggested in the prior art.

It might be a different case if Wang et al were an etching reactor, in which case we would have two references disagreeing as to the use of a metal liner in an etching reactor. But here the only teaching one of ordinary skill in the art would see is an explicit teaching that a ceramic liner

is OK but a ceramic liner containing metal Is a problem, and a teaching that a metal liner is acceptable in a deposition chamber where the conditions and concerns are very much different than in an etching reactor. It is only through hindsight that one could possibly combine these teachings and come up with obviousness to use a metal liner in an etching reactor.

It is irrelevant that Bosch may be used as a deposition chamber, since Bosch does not teach the metal liner in any event. As to Wang et al, the examiner cites to paragraph [0046] as support for motivation to use the Wang et al metal materials in place of the ceramic materials of Bosch et al because Wang says that metal is less brittle than ceramic. But Bosch et al explicitly requires ceramic in its etching reactor, and to use metal would be directly contrary to this teaching. A material less brittle my be all well and good, but not if for other reasons it is simply not acceptable. Wang et al does not at any time suggest that the materials it uses in a deposition chamber would perform satisfactorily in a much different etching environment. The entire purpose of Bosch et al is surface treatment to minimize particle contamination encountered with shaped and/or machined ceramic parts (col. 2, lines 58-63, and col. 4, lines 33-35). Using a non-ceramic material would make absolutely no sense in Bosch et al.

The examiner further cites to paragraph [0055] of Wang et al, which states that the Wang et al "invention" may be used in an etching chamber as well as in a deposition chamber. But the Wang et al invention is the provision of a plurality of laser-drilled recesses as recited in claim 1. The material of the liner plays no role in the Wang et al invention. So if one were to use the Wang et al invention in an etching chamber, one would have provided laser-drilled recesses in an etching reactor having ceramic liner as taught by Bosch. The simple mention of an etching reactor in paragraph [0055] provides no reason why anyone would want to use a metal liner in an etching reactor.

In the Advisory Action mailed April 9, 2008, the examiner responds to the above arguments by arguing that Bosch et al is not teaching away from the use of aluminum as a liner material, but is teaching that it is possible to use aluminum as a liner material but simply noting that you will then have a contamination problem. But if one reads Bosch et al more carefully, one sees discussion elsewhere in Bosch et al of the use of ceramic materials that include

aluminum, and the passage at lines 47-49 of column 10 suggests that it is advantageous to use a ceramic that does not contain aluminum so as to minimize aluminum contamination. To take this passage that clearly teaches that a ***ceramic*** containing aluminum has an aluminum contamination problem, and to somehow arrive at a teaching to one of skill in the art that it would be suitable to use an aluminum ***metal*** is about as pure an example of hindsight reasoning as one could imagine. The simple fact of the matter is that, with nothing in the art teaching suitability of a metal liner in an etching reactor (despite the fact that liners in etching chamers have been known for some time), and given the statement in Bosch et al that even an aluminum-containing ceramic would be problematic, the last thing one of skill in the art would want to do would be to use one of the metal shield materials of Wang et al in the Bosch et al device.

For the above reasons, reversal of the examiner is believed appropriate and is solicited.

Respectfully submitted,

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